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Three New Meconematine Species (Orthoptera, Tettigoniidae) from Shikoku and Kyushu, Japan

By

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(Communicated by Yoshihiko KUROSAWA)

Some eight species of tettigonids belonging to the Meconematinae have been known from Honshu, the main island of Japan and an unnamed species was recorded by IKEZAKI from Kyushu (IKEZAKI, 1981), but none from Shikoku.

There are some specimens of a meconematine species from Shikoku in the collection of the Entomological Laboratory, Kyushu University. A closer examination of them has revealed that they represent a new species belonging to the genus *Tettigoniopsis*.

On the other hand, two species of meconematine tettigonids are known to me from Kyushu. In the summer of 1978, I made a collecting trip to Mt. Hiko-san, northern Kyushu, and visited the Hikosan Biological Laboratory of Kyushu University. At that time, some material of meconematine tettigonid was collected by myself on the southwestern slope of the mountain. It consists of adults and nymphs of a new species which can be considered to belong to a new genus. Further, in 1980, Mr. Y. IKEZAKI, Nagasaki-nishi High School, Nagasaki, sent me an interesting material belonging to another species of *Tettigoniopsis* collected on the Shimabara Peninsula, western Kyushu. This was the undescribed species cited above and an obvious new species because of characteristic male cerci.

In the present paper, these three new species will be described and illustrated, together with a new genus. This is the third paper dealing with the Japanese Meconematinae followed by my 1982 and 1983 papers.

Before going futher, I wish to express my hearty thanks to Professor Y. HIRASHIMA, Kyushu University, for the loan of material, and to Dr. K. YASUTOMI, National Institute of Health, Tokyo, Dr. M. T. CHÛJÔ, Hikosan Biological Laboratory of Kyushu University, and Dr. M. HAYASHI, Saitama University, for their kind help in collecting material during my stay at the Hikosan Biological Laboratory. Thanks are also due to Mr. Y. IKEZAKI, for the privilege of giving me the opportunity to study on the interesting species from the Shimabara Peninsula. I also wish to express my sincere gratitude to Dr. S.-I. UÉNO for kindly reading the original manuscript and giving valuable advice.

Genus *Tettigoniopsis* YAMASAKI, 1982

Tettigoniopsis YAMASAKI, 1982, Bull. natn. Sci. Mus., Tokyo, (A), **8**, pp. 126–127; type-species: *Tettigoniopsis forcipicercus* YAMASAKI.

Two features given in the original description are herewith corrected. One of them is on the fastigial cone. A closer examination of the cone shows that it always has a very weak sulcus. The other correction is about the apex of ovipositor. Sometimes, it has a very weak hook at the apex of the ventral valves as shown in Figs. 6 and 16. It should also be added to the original description that the supra-anal plate sometimes becomes elongated and transformed, and accordingly, the posterior margin of the tenth tergite transforms.

Tettigoniopsis miyamotoi YAMASAKI, sp. nov.

[Japanese name: Shikoku-yabukiri-modoki]

(Figs. 1–10)

Small and slender. Male supra-anal plate elongate and transformed as shown in Fig. 8. Male cerci with two triangular lobes, one on the internal side and the other on the ventro-internal face, as shown in Fig. 10. Male subgenital plate without styli. Ovipositor with a very weak hook at the apex of the ventral valves.

Male. Head relatively small as shown in Fig. 1; fastigial cone moderately protruded with a weak sulcus; occiput smooth and round. Eyes subglobular, relatively small. Pronotum (Figs. 1 and 2) relatively slender, shallow, with a V-shaped sulcus just before the centre of disc and without humeral sini. Lateral foramina (auditory thoracic spiracles) (Fig. 2f) medium-sized among the Meconematinae, clearly visible in lateral view. Fore wings as shown in Figs. 3 and 4, about three-fourths of the wings being concealed under the metazona of pronotum; stridulatory vein slender, and stridulatory teeth about 40 in number. Hind wings absent. Fore and middle legs with unarmed femora; tibiae with 3 internal and 4 external spines on the ventral margins and apex with one small spine each at both sides; auditory structure of fore tibiae widely elliptical. Hind legs with unarmed femora; tibiae with 25 to 27 teeth on both the dorsal margins, and apex with four spurs. Metathoracic basisternite with round tubercles on both the lateral sides; tubercles with setae.

Abdominal end as shown in Figs. 7–10. The tenth tergite normal. Supra-anal plate (Fig. 8) elongate but transformed, wide at the base, with incurved margins, making an X-shaped protuberance dorsad and canaliculate mesally, then compressed dorsally and protruded posteriorly in apical third; apex slightly wide, concave posteriorly. Cerci (Figs. 7–10) wide in basal one-fifth and slender in the remaining part; basal wide part with a triangular lobe inside and distal slender part with a wider triangular lobe at its inner median part; apical one-third recurved and incurved; apex round. Subgenital plate (Fig. 10) rapidly becoming narrower at a half, then becoming gently wider; posterior margin roundly incurved; styli absent.

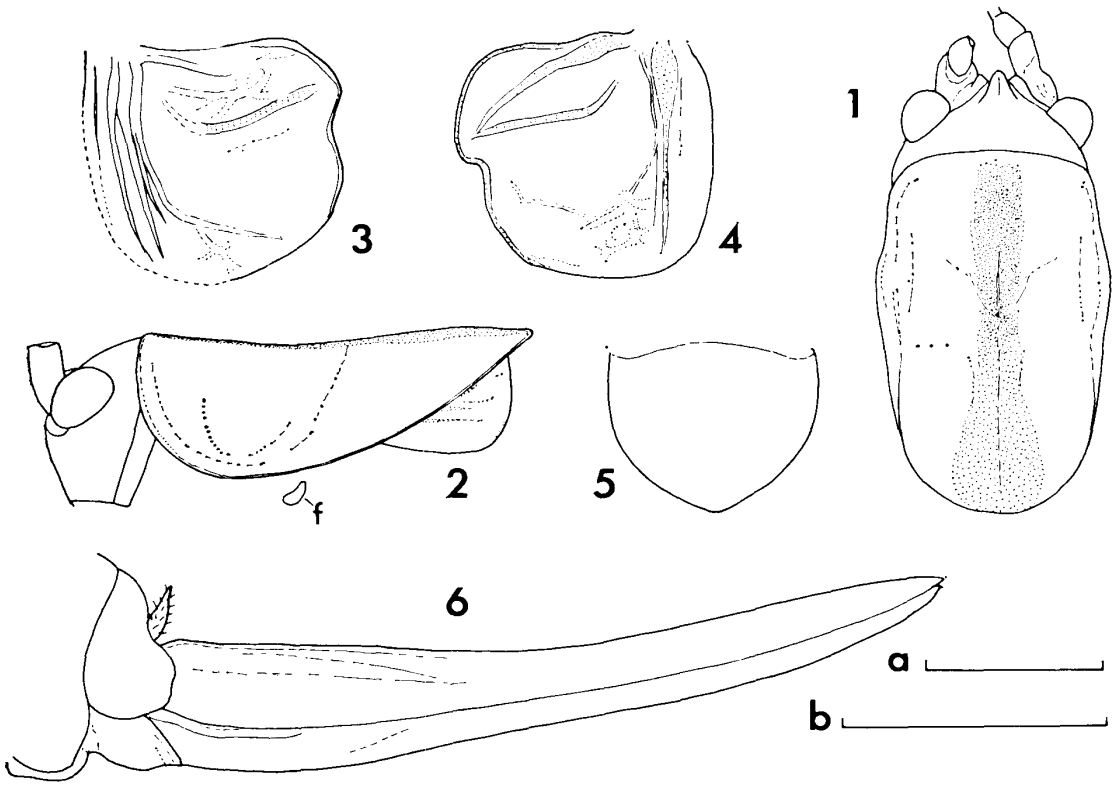


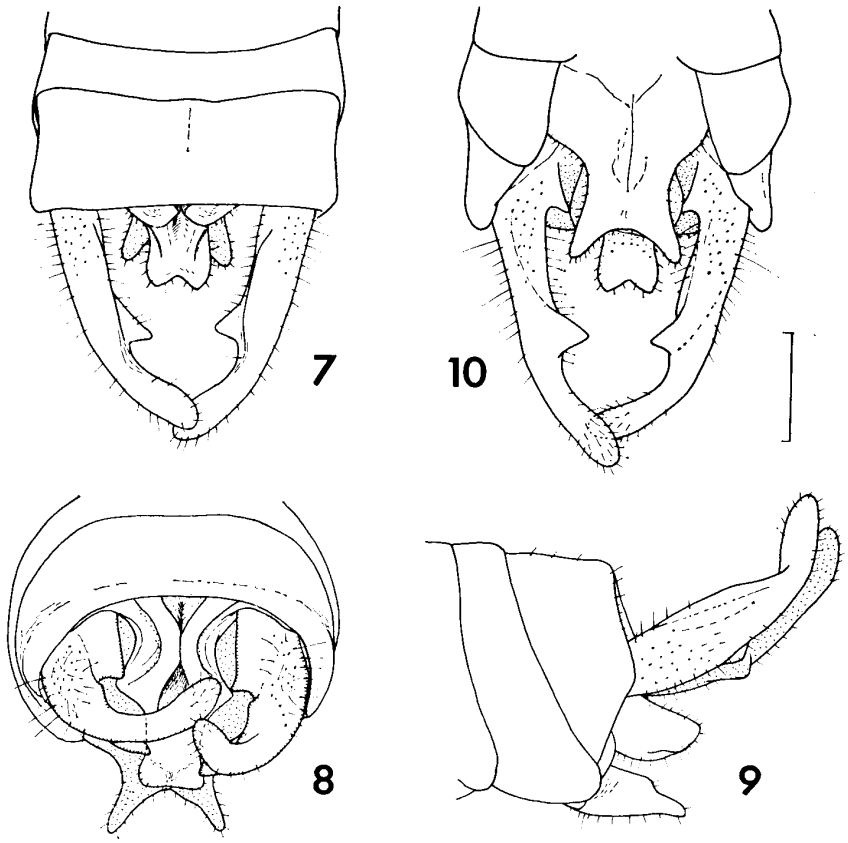
Fig. 1–6. *Tettigoniopsis miyamotoi* YAMASAKI, sp. nov. —— 1 and 2. Male head and pronotum, dorsal (1) and lateral (2) views. f, lateral foramina. —— 3 and 4. Male left (3) and right (4) fore wings. —— 5. Female subgenital plate, ventral view. —— 6. Female abdominal end and ovipositor. Scales, 2 mm. Scale a is for Figs. 1, 2 and 6, and scale b for Figs. 3–5.

Female. Fore wings mostly concealed under the metazona of pronotum.

Abdominal end as shown in Fig. 6. Supra-anal plate short and semicircular. Cerci conical under normal condition. Subgenital plate scutiform as shown in Fig. 5. Ovipositor as shown in Fig. 6, nearly of the same length as a dried body, slightly recurved, becoming narrower in apical half than in basal half; apex with a weak hook in the ventral valves.

Coloration. Probably green in living individuals, and dorsally with a dark brown mesal band on the body from occiput to abdomen. The band becomes wider in the metazona of pronotum. Teeth of the dorsal margins of hind tibiae brownish and apex of lower lobe of all femora black. Ovipositor brownish.

Measurements (mm). Body length to apex of cercus, ♂ 10.8–12.0 (12.0 in holotype); body length to apex of ovipositor, ♀ 18.0–18.7; body length to base of ovipositor, ♀ 9.5–10.2 (these lengths are for contracted bodies resulting from dried specimens); head width (extraocular distance), ♂ 2.1–2.3 (2.1), ♀ 2.4–2.5; pronotal length, ♂ 4.1–4.4 (4.1), ♀ 4.3–4.5; fore wing length, ♂ 2.1–2.2 (2.1), ♀ 1.2 (in one specimen); hind femoral length, ♂ 9.2–9.9 (9.5), ♀ 10.3–10.8; hind tibial length, ♂ 10.0–10.9 (10.4), ♀ 11.2–12.1; cercal length, ♂ 2.5–2.8 (2.5); ovipositor length, 9.9–10.1.



Figs. 7–10. Male abdominal end of *Tettigoniopsis miyamotoi* YAMASAKI, sp. nov. —— 7. Dorsal view. —— 8. Obliquely caudal view. —— 9. Lateral view. —— 10. Ventral view. Scale, 1 mm.

Type-series. Holotype: ♂, "(Shikoku), Matsuyama, Iyo, 12–13. vii. 1952" (S. MIYAMOTO). Paratypes (including allotype): 2 ♀, "(Shikoku), Minaminoma, Awa, 20. vii. 1952" (S. MIYAMOTO) (one of these is designated as the allotype); 3 ♂ 1 ♀, "(Shikoku), Matsuyama, Iyo, 12–13. vii. 1952" (S. MIYAMOTO).

The holotype and the allotype are deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo. Three paratypes (2 ♂ 1 ♀) are deposited in the collection of the Entomological Laboratory of Kyushu Univeristy. Two paratypes (1 ♂ 1 ♀) are preserved in my collection for further study (these paratypes should be returned to the Entomological Laboratory of Kyushu Univ.).

Localities of the type-series. Matsuyama, Iyo (Ehime Prefecture) (type-locality!) and Minami-noma, Awa (Tokushima Prefecture).

Notes. This species is known so far only from Shikoku and is remarkable in the absence of male styli. The teeth number of the stridulatory vein is intermediate between those of *T. forcipicercus* (15 in number) and the following species (about 90 in number).

The species name is dedicated to Professor Syoiti MIYAMOTO who first collected specimens of the present insect.

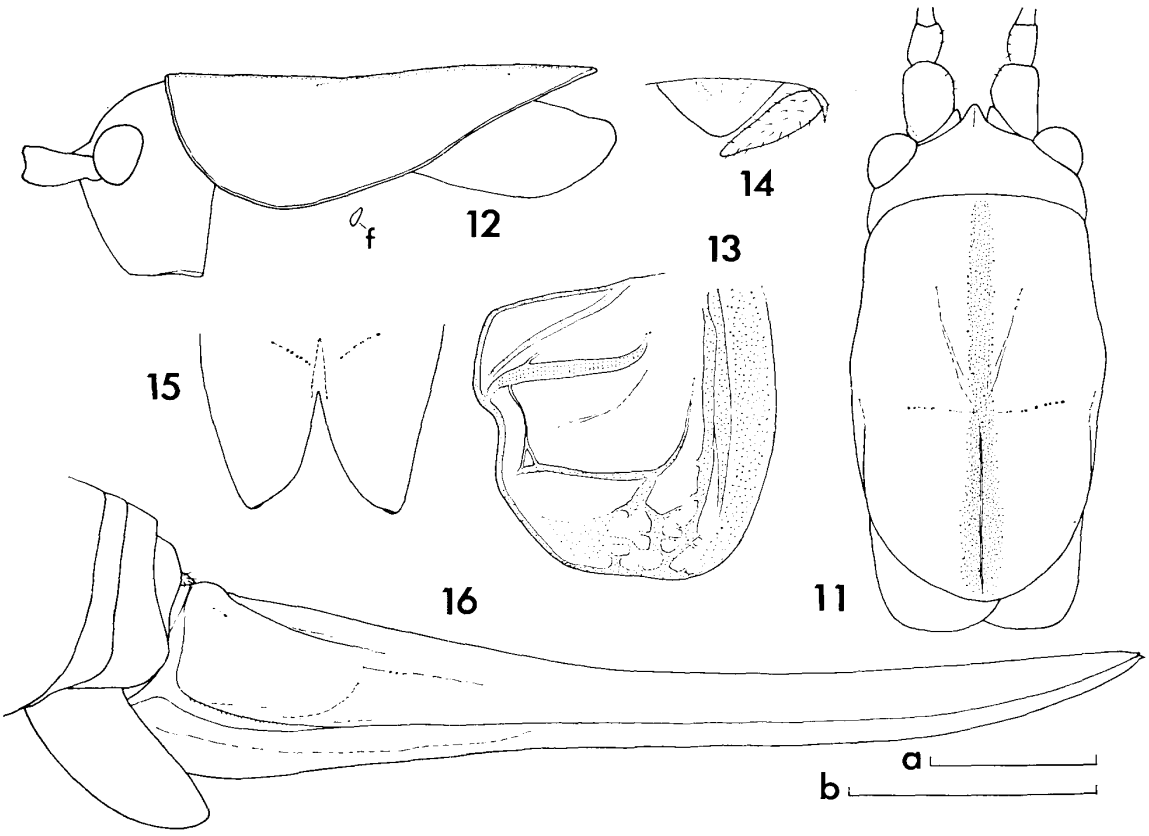
Tettigoniopsis ikezakii YAMASAKI, sp. nov.

[Japanese name: Unzen-yabukiri-modoki]

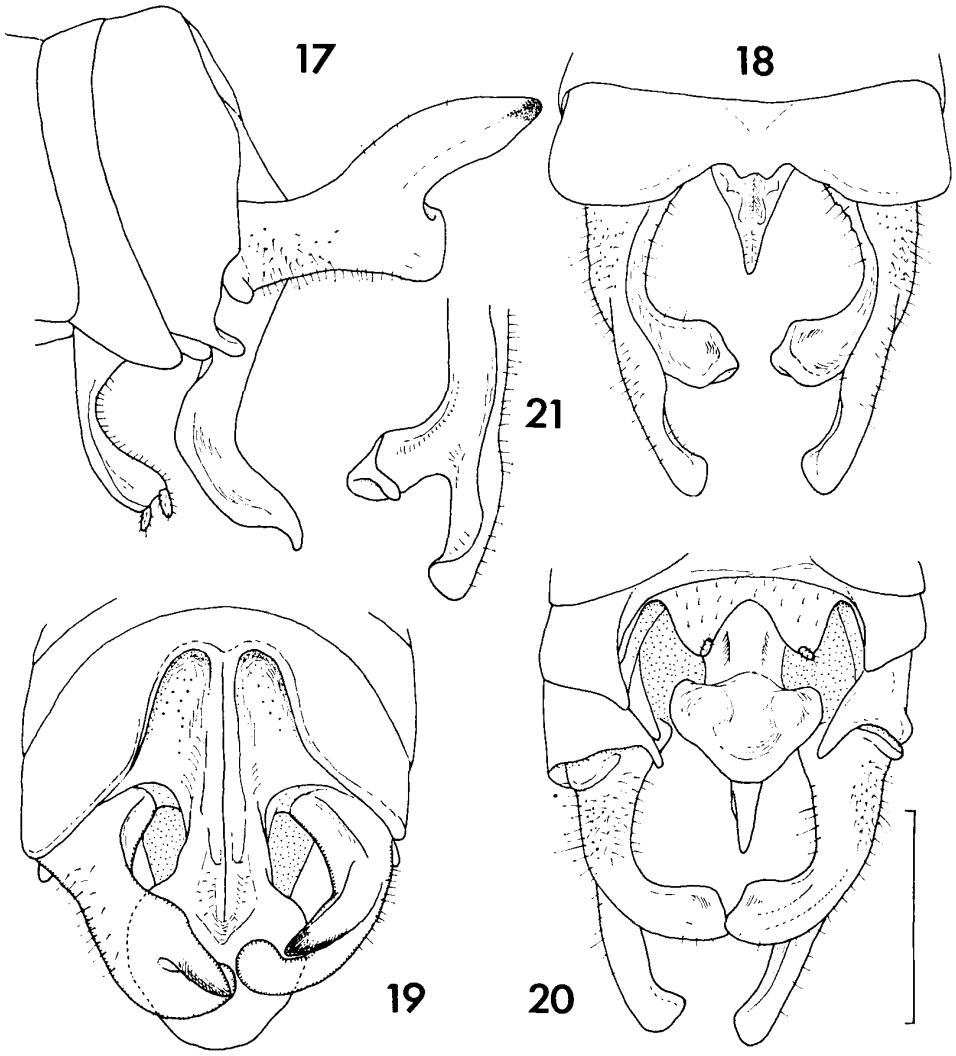
(Figs. 11–21)

Small, but robust. Bright grass-green with reddish brown band on the disc of pronotum. Male abdominal end much modified; cerci with a posteriorly protruded long branch, supra-anal plate very elongate and transformed as shown in Fig. 19, and subgenital plate also elongate.

Male. Head normal as shown in Figs. 11 and 12; fastigial cone weakly sulcate. Eyes subglobular. Pronotum broad, smooth and shining on the surface; anterior margin slightly round and posterior margin round; disc with weak V-shaped sulcus on the posterior half of prozona; metazona slightly convex. Fore wings degenerated as shown in Fig. 13, mostly concealed under pronotum; stridulatory vein broad, and stridulatory teeth 92 in number in a paratype specimen. Hind wings absent. Fore and middle legs with unarmed femora; tibiae ventrally with four pair of long spines; audi-



Figs. 11–16. *Tettigoniopsis ikezakii* YAMASAKI, sp. nov. —— 11 and 12. Male head, pronotum and fore wings, dorsal (11) and lateral (12) views. f, lateral foramina. —— 13. Male right fore wing. —— 14. Female supra-anal plate and cercus, dorsal view. —— 15. Subgenital plate, ventral view. —— 16. Female abdominal end and ovipositor. Scales, 2 mm. Scale a is for Figs. 11, 12 and 16, and scale b for Figs. 13–15.



Figs. 17–21. Male abdominal end and cercus of *Tettigoniopsis ikezakii* YAMASAKI, sp. nov. —— 17. Lateral view. —— 19. Dorsal view. —— 19. Obliquely caudal view. —— 20. Ventral view. —— 21. Male right cercus (basal part omitted). Scale, 2 mm.

tory structure in the fore tibia long elliptical. Hind legs with unarmed femora; hind tibiae with 15–22 external and 17–23 internal teeth along the dorsal margins, of which the internal teeth are always more numerous than the external one on one tibia, and apex with four spurs.

Abdominal end as shown in Figs. 17–20. Tenth tergite roundly excised in a W-shape; lateral ends protruded posteriorly; postero-mesal margin continuing to the supra-anal plate. Supra-anal plate (Figs. 17–20) much elongated ventrad, its obliquely caudal view as shown in Fig. 19; basal two-thirds strongly compressed and elevated mesally, highest at its centre, and apical half depressed, then becoming wider and roundly cordate. Cerci (Figs. 17–21) excavated inside and strongly incurved at the apical one-

third; apical part widened and apex obtusely angulate; one long branch growing out of the dorsomedian part and protruded posteriorly, apex roundly compressed. Subgenital plate as shown in Fig. 20, narrowing posteriorly and excised in a V-shape on the posterior margin; styli short.

Female. Fore wings completely concealed under pronotum.

Abdominal end as shown in Fig. 16. Supra-anal plate (Fig. 14) triangular but its apex is round. Cerci conical in normal style. Subgenital plate large and wide, deeply excised in a V-shape. Ovipositor long as shown in Fig. 16, almost straight but weakly recurved at the apical one-third, basal part swollen and apex with very weak hook in the ventral valves.

Coloration. Bright grass-green with reddish brown band on the disc of pronotum. Teeth of the dorsal margins of hind tibiae brownish.

Measurements (mm). Body length to apex of cercus, ♂ 11.4–12.2 (11.4 in holotype); body length to apex of ovipositor, ♀ 23.9; body length to base of ovipositor, ♀ 12.7; head width, ♂ 2.5 (2.5), ♀ 2.6; pronotal length, ♂ 4.9–5.3 (5.3), ♀ 5.0; fore wing length, ♂ 10.0–10.3 (10.0), ♀ 11.2; hind tibial length, ♂ 10.1–11.2 (10.1), ♀ 12.0; cercal length, ♂ 3.2–3.5 (3.2); ovipositor length, 11.4.

Type-series. Holotype: ♂, Azami-dani, Unzen, Nagasaki, 4. x. 1978 (Y. IKEZAKI). Paratypes (including allotype): 1 ♂ 1 ♀ (allotype), same data as the holotype; 1 ♂, Azami-dani, Unzen, Nagasaki, 28. viii. 1978 (Y. IKEZAKI).

All the type-specimens are deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo.

Type-locality. Unzen, Shimabara Peninsula, Nagasaki, western Kyushu, Japan.

Notes. According to IKEZAKI (1981), the present species occurs on Mt. Tara-dake, lying on the northeastern borders of Nagasaki Prefecture, and Mt. Hiko-san, towering on the borders between Fukuoka and Ôita Prefectures. Therefore, this species may be widely distributed in the mountainous areas of northern half of Kyushu. At Unzen, this species lives in defoliated broadleaved forests of the mountainous areas over 1,000 m above the sea (IKEZAKI, *loc. cit.*).

This species is named in honour of Mr. Yoshihiro IKEZAKI, the first collector of the species.

Genus ***Allotettigoniopsis*** YAMASAKI, nov.

Type-species. Allotettigoniopsis hikosana YAMASAKI, sp. nov.

Meconematinae. Small-sized. Brachypterous. Closely related to *Tettigoniopsis*, but differs from it in the following characters: Pronotum rather long, very shiny; metazona roundly, but slightly, convex; lateral foramina of thorax (thoracic auditory spiracles) small, but visible in latero-caudal view; male fore wings mostly concealed under the metazona of pronotum, but the apical one-fourth is exposed; lateral lobes of ultimate tergite extending latero-posteriorly and covering the basal part of cerci; male cerci compressed, soft, and gently incurved; male styli relatively long and slender;

ovipositor sword-like, long and slender, apex without hook.

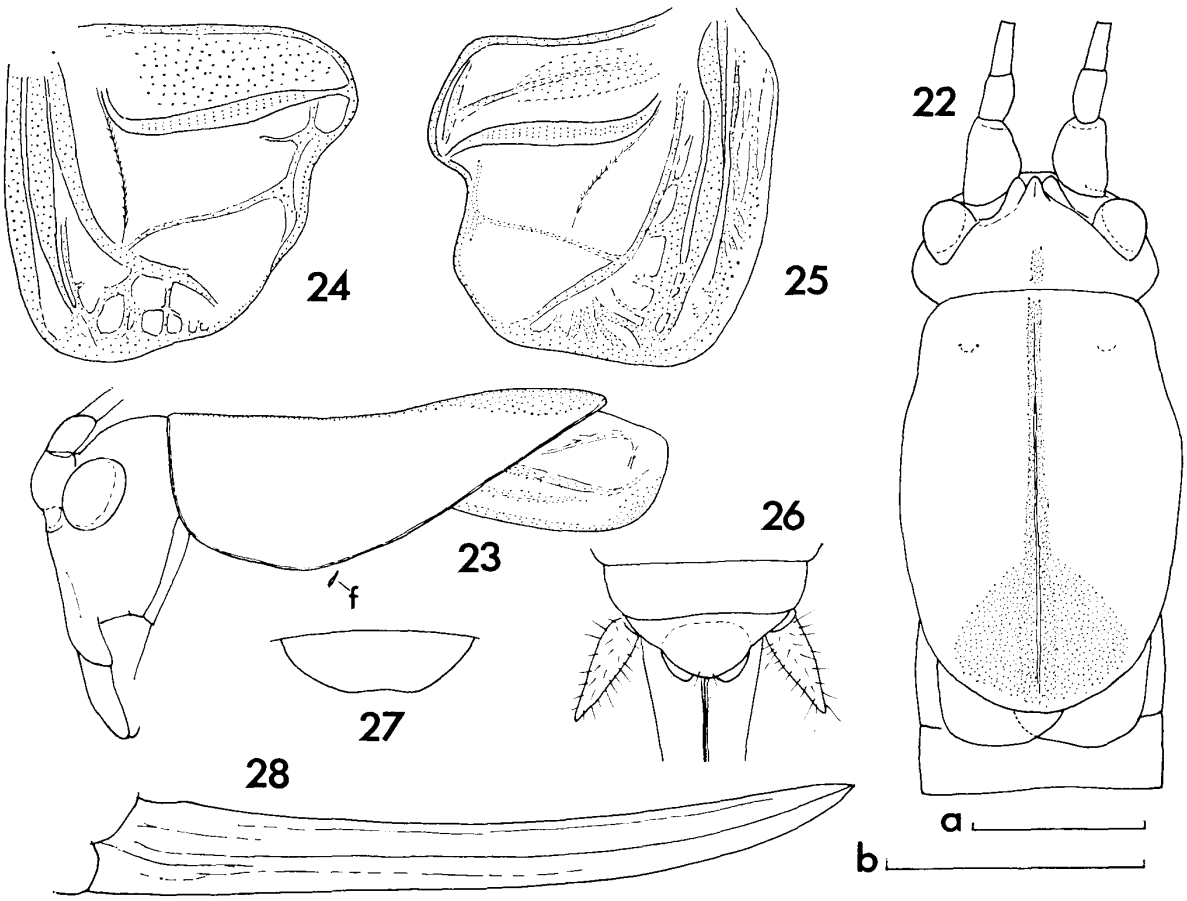
Notes. Though the present genus is very similar to *Tettigoniopsis*, it is difficult to find out evidences that they are actually congeneric. The total impression of pronotum is utterly different from that of the latter genus, and the soft, dorso-ventrally wide cerci are also different from those of the other genus. In any case, I should like to erect a new genus for the Hiko-san species as the first step of study. This problem will remain unsolved till the time when much ampler material can be examined.

Allotettigoniopsis hikosana YAMASAKI, sp. nov.

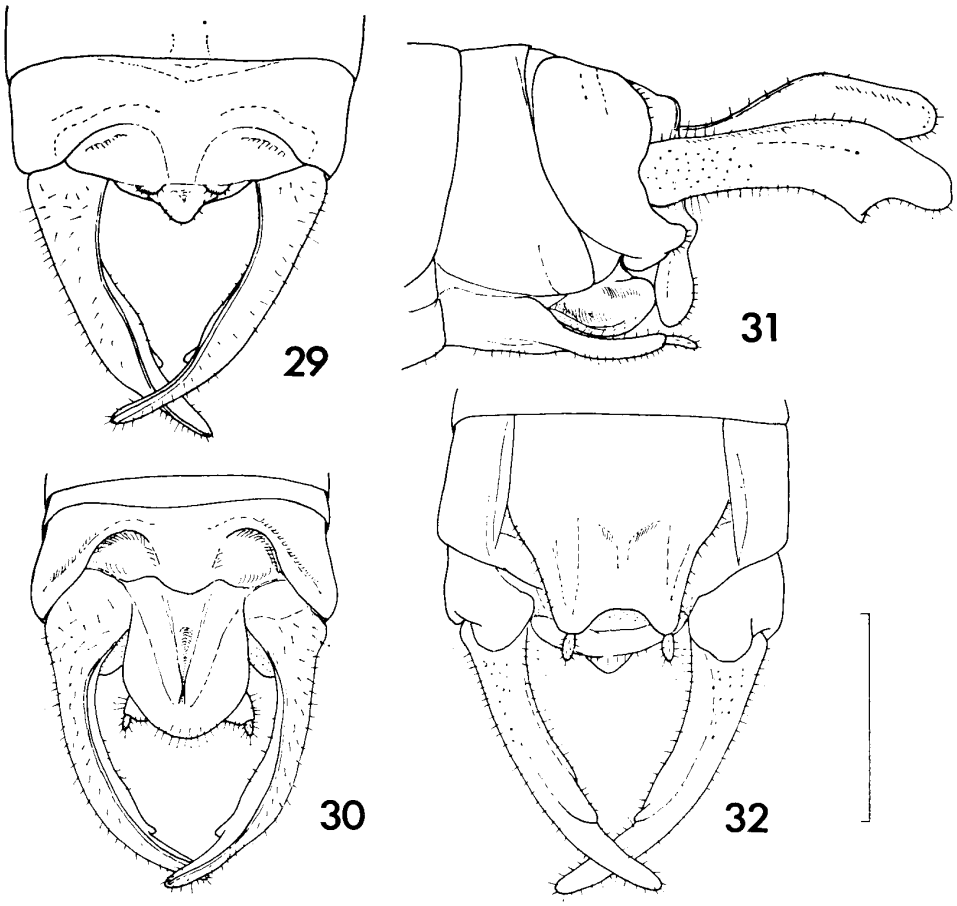
[Japanese name: Hikosan-hime-yabukiri-modoki]

(Figs. 22–32)

Pronotum long, shiny with a mesal brownish band on prozona and a wider brown-



Figs. 22–28. *Allotettigoniopsis hikosana* YAMASAKI, gen. et sp. nov. —— 22 and 23. Male head and pronotum, dorsal (22) and lateral (23) views. f, lateral foramina. —— 24 and 25. Male left (24) and right (25) fore wings. —— 26. Female abdominal end (ultimate instar nymph), dorsal view. —— 27. Female subgenital plate (ultimate instar nymph), ventral view. —— 28. Ovipositor (ultimate instar nymph). Scale, 2 mm. Scale a is for Figs. 22, 23 and 28, and scale b for Figs. 24–27.



Figs. 29–31. Male abdominal end of *Allotettigoniopsis hikosana* YAMASAKI, gen. et sp. nov. —— 29. Dorsal view. —— 30. Obliquely caudal view. —— 31. Lateral view. —— 32. Ventral view. Scale, 2 mm.

ish macula on metazona. Male supra-anal plate scutiform as shown in Fig. 30. Male cerci compressed and incurved as shown in Figs. 29–32. Male styli long and slender. Ovipositor without hook at the apex.

Male. Head robust and broad as shown in Figs. 22 and 23; fastigial cone with a weak sulcus on dorsum. Pronotum long, very shiny, and convex roundly, but slightly, in metazona; anterior margin slightly round or almost straight; posterior margin round; lateral lobes shallow, without sini. Thoracic foramina (thoracic auditory spiracles) small, but visible in latero-caudal view. Fore wings (Figs. 24 and 25) degenerated, but a little larger than those of the *Tettigoniopsis* species, reaching second abdominal tergite stridulatory vein robust, and stridulatory teeth 90–108 in number. Fore and middle legs with unarmed femora; tibiae with four pair of spines on ventral margins; auditory structure in the fore tibiae open, long elliptical. Hind legs with unarmed femora; tibiae with 25 to 31 teeth on both the dorsal margins, and apex with four spurs. Meso- and metathoracic basisternites with tubercles at both posterior sides; tubercles shiny with setae.

Abdominal end as shown in Figs. 29–32. The tenth tergite concave at the bases of cerci; posterior margin excised shallowly in both sublateral parts; lateral lobes narrowest at the base of cerci, and then widened in lateral ends which ventrally cover basal part of cerci. Cerci (Figs. 29–32) dorso-ventrally widened and incurved, and recurved at the apical one-third, where a wide triangular lobe occurs ventrally, excavated inside and round at the apex. Supra-anal plate scutiform as shown in Fig. 30, covered caudal part of genitalic space. Subgenital plate as shown in Fig. 32, narrowing in apical half; posterior margin incurved; styli long and slender.

Female (ultimate instar nymph). Supra-anal plate (Fig. 26) round on the posterior margin. Cerci conical. Subgenital plate round on the posterior margin, but it is slightly incurved at the central part, as shown in Fig. 27. Ovipositor (Fig. 28) long, slender and almost straight, but slightly recurved at the apical one-third, without hook at the apex.

Coloration. Body with a brown dorsal band from occiput to abdomen, but the metazona of pronotum with a brownish wide macula. Spines of fore and middle legs brownish. Hind tibia with black teeth on both the dorsal margins. Apex of lower apical lobes of each femora black.

Measurements (mm). Body length to apex of cercus, ♂ 11.0–13.6 (13.4 in holotype) and 16.0 in a specimen preserved in alcohol; head width (extraocular distance) ♂ 2.5 (2.5); pronotal length, ♂ 4.9–5.3 (4.9); fore wing length, ♂ 3.0–3.2 (3.1); hind femoral length, ♂ 10.2–11.8 (11.7); hind tibial length, ♂ 11.4–12.7 (12.7); cercal length, ♂ 2.6–3.2 (2.9).

Type-series. Holotype, ♂, Mt. Hiko-san, Fukuoka Prefecture, Kyushu, 9. vii. 1978 (T. YAMASAKI). Paratypes: 4 ♂, Mt. Hiko-san, Fukuoka Prefecture, Kyushu, 7–9. vii. 1978 (T. YAMASAKI).

All the specimens of the type-series are deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo.

Other material examined. 1 ultimate instar ♀, Mt. Hiko-san, Fukuoka Prefecture, Kyushu.

Type-locality. Mt. Hiko-san, Fukuoka Prefeture, northern Kyushu, Japan.

Notes. This species was collected on the slope of Kita-dake of Mt. Hikosan. The insects lived on the leaves of *Faxinus spaethana* (Shioji in Japanese) forest. One female specimen before me may be ultimate instar nymph. Therefore, I refrained from designating it as the allotype.

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